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PF-4 Seismic Performance Reassessment Project (P-SPRaP)

Interim Risk Methodology and Deliverables

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Introduction



- **Background:**

Interim Risk was added to P-SPRaP (SPR Phase 2) to produce intermediate results which build confidence, exercise methodology, develop early insights, and (most importantly) mitigate LANL pit production program risk.

- **Status:**

SPR Phase 2 is actively underway, has P-SPRaP project team priority focus, and is targeting completion in FY21 (September 2021).

- **Deliverable:**

Presentation of interim risk results (loss of confinement for screened in failure modes), list of potential criticisms of Interim Risk approach / methodology that intervenors could raise, cost and schedule for completion of Final Risk

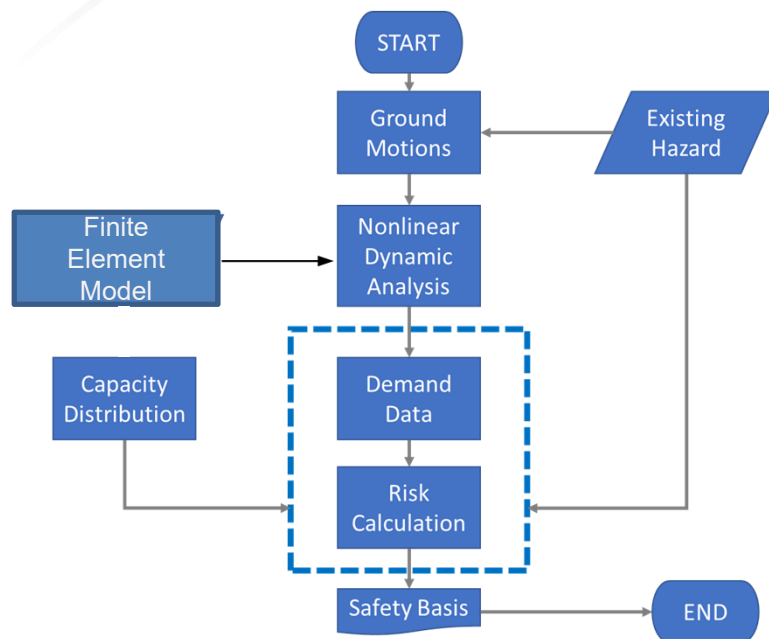
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Slide 2

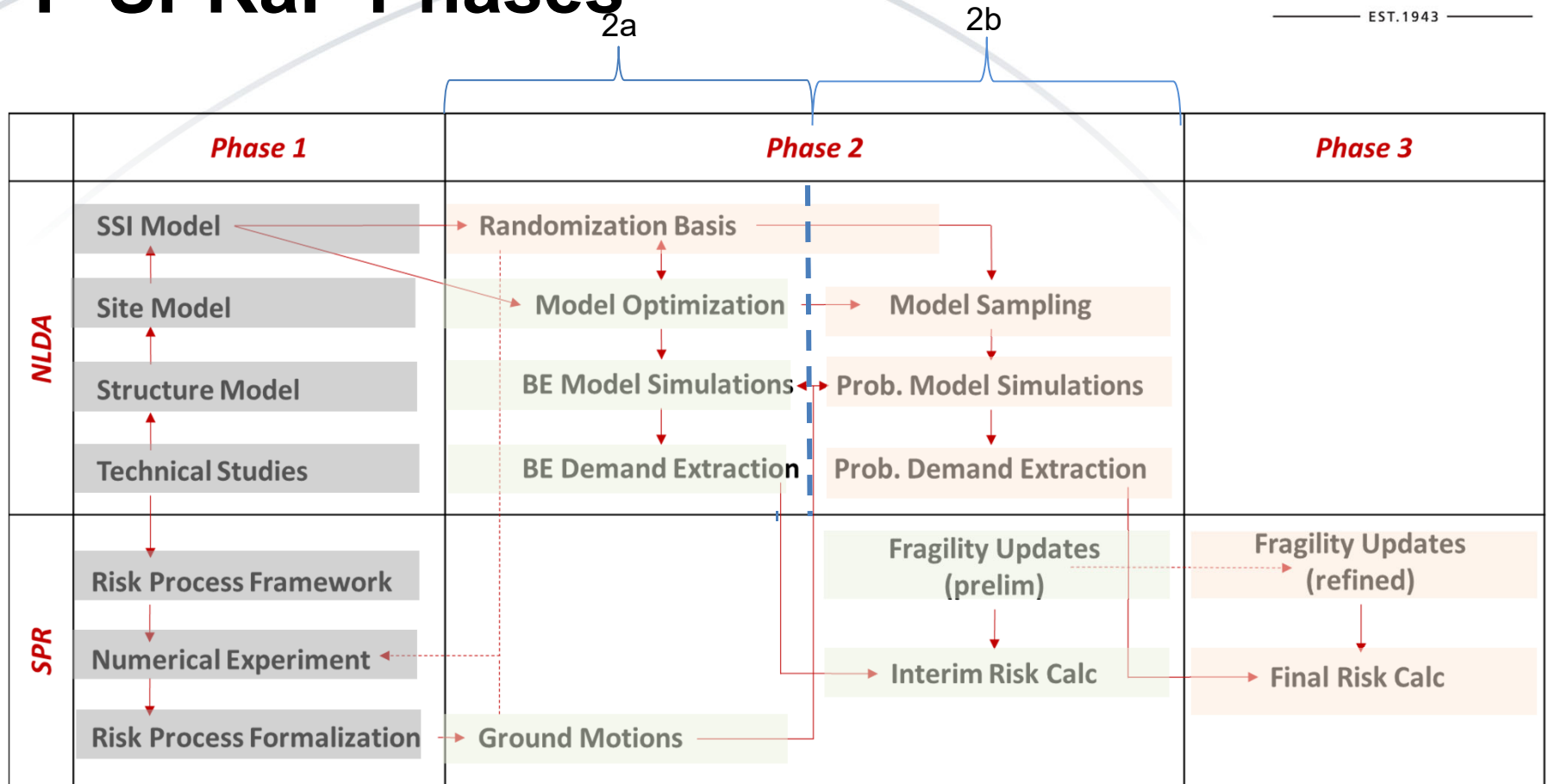
P-SPRaP Framework



- Ground motions across range of seismic hazard
- Nonlinearity in soil and structure behavior
- Component-level seismic performance and EDPs
- Probabilistic capacity estimates (fragilities)
- Explicit risk computation

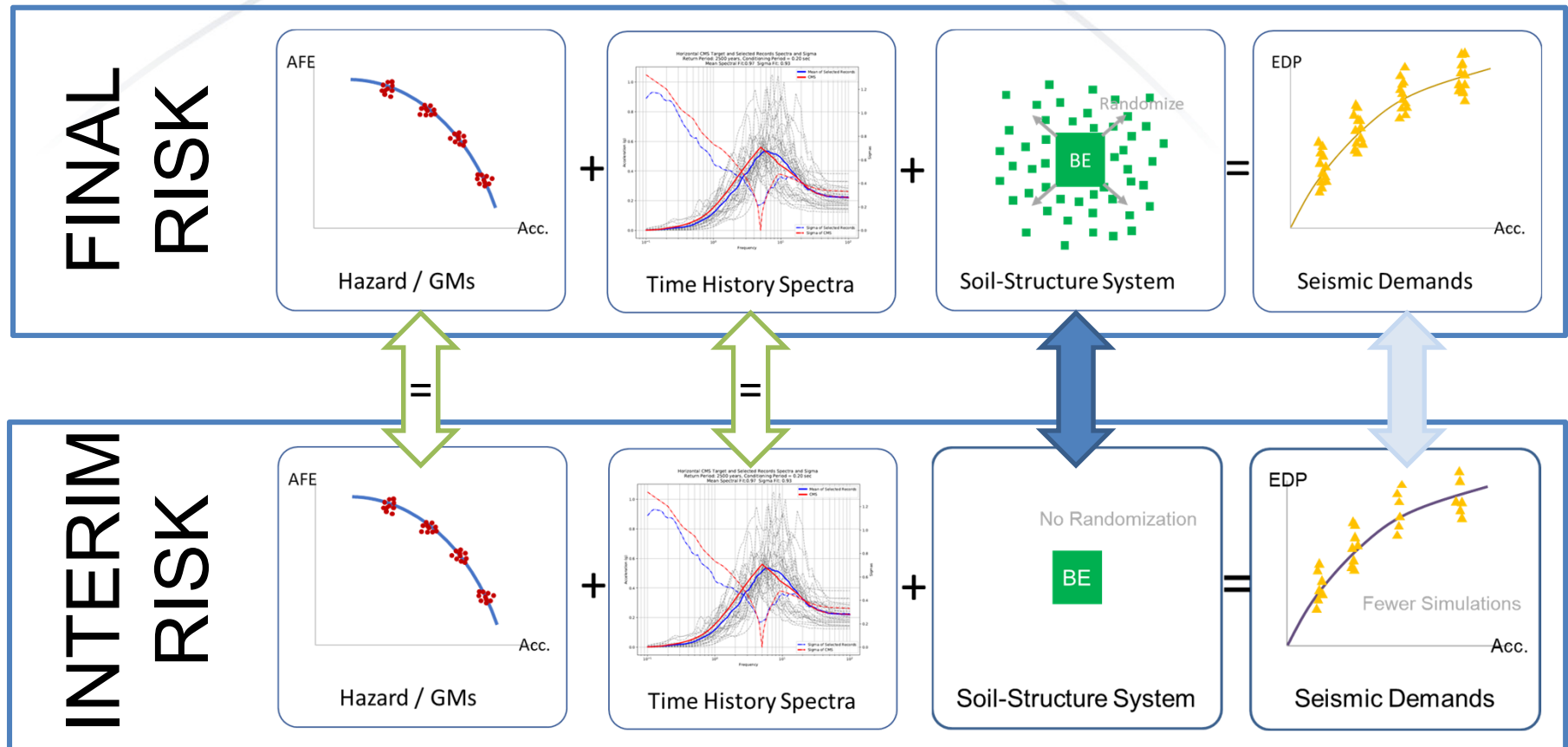
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P-SPRaP Phases



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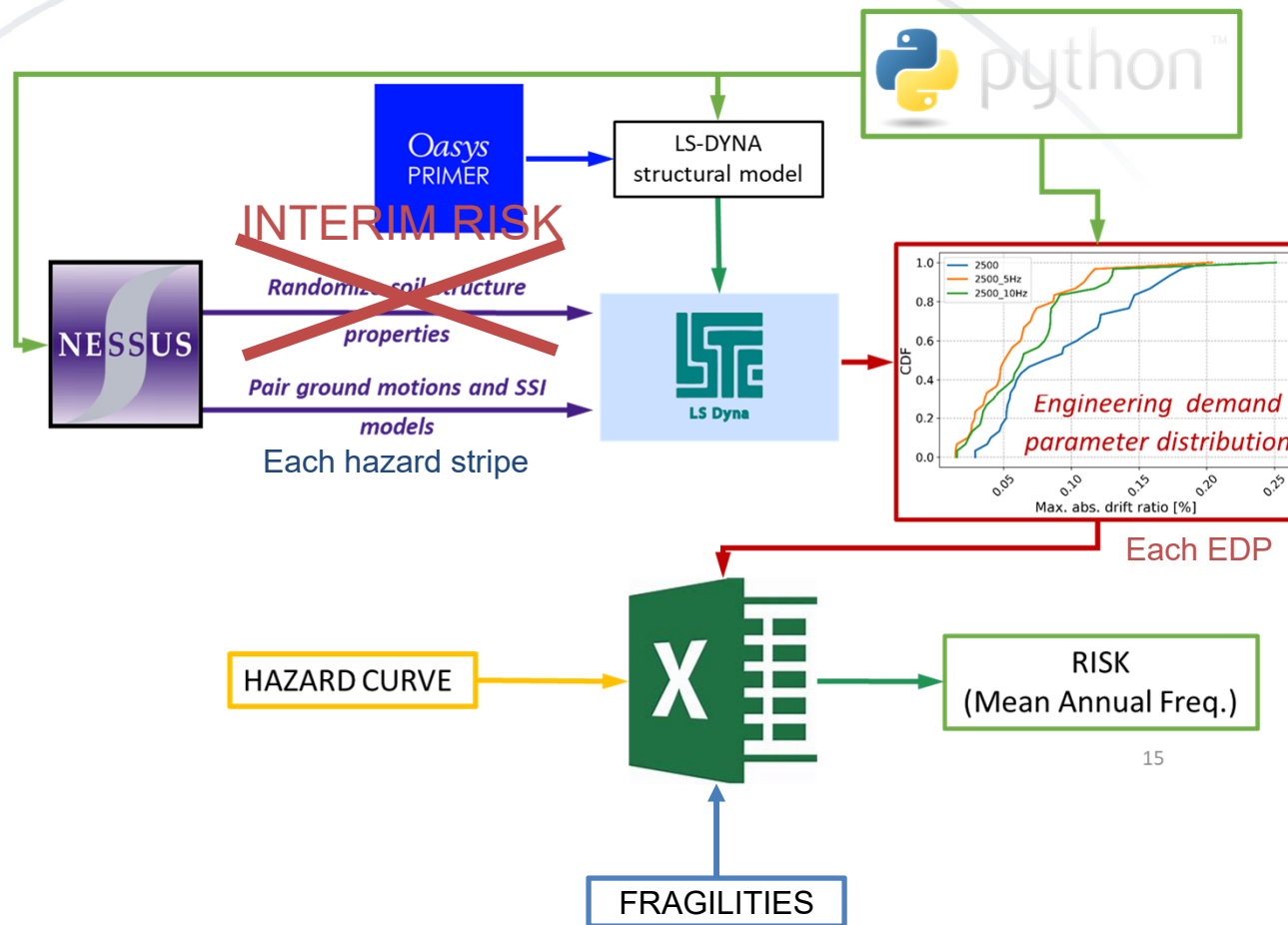
Interim vs. Final Risk



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Computation Workflow



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Interim vs. Final Risk

Feature	Final	Interim	Notes
BE SSI Model	✓	✓	Same nonlinear BE SSI model
HPC Simulations	✓	✓	Same computing system for both
Risk Calculator	✓	✓	Same tool for both
Multiple EDPs	✓	✓	EDPs for each failure mode
Fragility Capacities	✓	✓	Preliminary for Interim Risk
Hazard Stripes	✓	✓	Preliminary for Interim Risk
GM Variability	✓	✓	GM suite for each of 4 UHRS
Structure Variability	✓		None for Interim Risk*
Soil Variability	✓		None for Interim Risk*

* Considering estimating via sensitivity study to include approximate effect

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Known Limitations of Interim Risk

#	Limitation	Mitigation
1	Not considering soil / structure variability will under-estimate risk.	Sensitivity study being considered to quantify and/or include the effect.
2	Process and products are not peer reviewed.	In-process result only, not intended for reference in Documented Safety Assessments, meant as preview for Final Risk only. Final Risk is peer reviewed.
3	Software and calculations not performed per nuclear QA standards.	In-process result only, not intended for reference in Documented Safety Assessments, meant as preview for Final Risk only. Final Risk <u>may</u> be per nuclear QA.
4	Fragility capacities are preliminary.	Preliminary fragilities are conservatively biased. Interim Risk results inform fragility refinement.
5	Hazard stripes may not be optimal for all EDPs.	Interim Risk informs governing failure mode(s) and dominating hazard level(s) for Final Risk focus.
6	No insights gained on soil/structure RV importance.	Randomization Refinement study is performed in parallel for this purpose, leveraging other SSI runs.

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Intended Use of Interim Risk

- Provides project sponsors (NNSA/WIPO) with preview of what Final Risk numbers may be
- Mitigates TA-55 program risk for other programs
- Is not intended to be used as updated QA pedigree reference for DSA use
- Proves nonlinear fragility framework to be used in either Final Risk or other NNSA projects
 - UPF
 - MOX Repurposing
- Cost/Schedule with IR results may be used by decision makers on funding Final Risk

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